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Standardization in the development and delivery methods of technology workshops

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STANDARDIZATION IN THE DEVELOPMENT AND DELIVERY METHODS OF TECHNOLOGY WORKSHOPS

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

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in

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ABSTRACT

Trainers have long relied on visual content to make their training more effective. As the use of computer-based delivery has become an accepted method of distributing training and instructional materials, a system of standardizing the development and delivery of training workshops was worthy of considerable attention. A review of the core works in the field of instructional design and education reveals that resources for evaluating and developing such standards at a scholastic level currently exist within a carefully guided review of the literature. A further review of the literature was conducted to identify areas in which content and design standards could be formed and easily followed.

Using theories of visual design, instructional design, and adult learning as criteria, these studies were analyzed to determine whether the educational theory and design methodology used translates to a training environment. The study concludes that while many of the older studies do not directly address the use of computer-based presentation applications, a development process can be achieved to streamline the creation of instructional content while maintaining consistency and quality in the content created.

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I thank all my friends and family, who collectively have been an inspiration throughout my life and always supported my dreams and aspirations. Finally, I'd like to thank Emily, for her wisdom, friendship, understanding, and diligent support throughout this endeavor.

DEDICATION

I dedicate this work to Brittan Smith.

The family is one of nature's masterpieces.
~George Santayana

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CHAPTER ONE

BACKGROUND

Introduction

Computer technologies and applications are now easily accessible and widely used in both in educational and business environments. Related to this fact, the use of presentation applications- the most common being Microsoft PowerPoint- has become an extremely common method of relaying information and data in lectures and training. While the use of these presentation applications are quickly becoming the mainstream approach for sharing information to small and large groups, little research has been conducted to measure the effectiveness, i.e. learning and retention of content- presented in this manner of distributing information over more traditional methods.

Related to this oversight are the qualities of developers called upon to create these materials. Quite often the methods used during the creation process give little attention to learning theories or visual design theories. Over time, the lack of attention to these established theories has created an absence of standards in the development of computer-based delivery of informational content. Of any available standards, few are

based on scholarly research of learning effectiveness but instead are typically based on personal preferences and previous experience of the development or administrative staff.

In environments with a reasonably high "turnover rate" of development staff, any process of creating workshop materials is often lost when existing staff leave. Re-creating or re-training from the beginning steps with each succession of staff only serves to intensify the problem.

Statement of the Problem

Higher standards in education and workplace training expectations have resulted in an increased need for training in computer literacy, technology skills, and business skills. In order to develop well-trained staff in any profession, assuring consistency in the quality of content and delivery methods of their training should be desired as well. Without measurable data about the effectiveness of various design styles or formats, it becomes difficult to develop standards relevant to these needs. In turn, no method of ensuring the quality of one design or format over another is available for consideration.

Purpose of the Project

The purpose of this project was to acknowledge these issues as valid concerns, review and document potential methods in standardizing the production of content for technology-oriented workshops, and to create an example of a simplified resource to address these concerns. Development staff were to be provided training on how to use this resource effectively in the development and presentation of these workshops. This project was founded on the basis of addressing these concerns and serves as an attempt to provide a foundation for continued interest in this subject.

The initial phase of this project centered on the development of criteria that would guide the format to be used. The second phase of this project focused on the design of a template-based resource based on these criteria. The structure of the templates created an adherence to design styles with minimal understanding of rationale by development staff. These templates were supported in part by written tutorials as well as demonstration workshops designed to walk developers through the use of the templates. Short surveys given before and after these workshops provided a measure of staff understanding of the demos and templates.

Significance of the Project

The use of computer-based delivery has become an accepted method of distributing training and instructional materials in educational and private business environments. These technologies aid in distribution and make the development process faster and easier. Yet little research has been done thus far, to determine how much, or even if these methods yield better results. While these methods should be easy to learn quickly and repeat on a continual basis, they should also insure a level of quality and effectiveness. To address these goals, a system of standardizing the development and delivery of training workshops was worthy of considerable attention.

The significance of this project lies in the results of how development standards based on scholarly research of learning styles and concepts of design are incorporated in to the instructional process. Additionally, the establishment of a streamlined development tool that adheres to these standards should allow for the creation of future presentation-based workshops at a consistent level of quality and value.

Assumptions

This project operated under a few assumptions directly related to the goals of the research:

- That the necessary resources and tools (computers, appropriate software applications, etc.) were available as needed.
- That staff were able to participate in research and development without a major disruption of their work requirements.
- That testing or assessment could be conducted as normal work activity and for purposes of quality improvement.
- That research and observations could be conducted in established or commonly accepted educational settings and involving normal educational practices. And finally,
- That the opportunity to introduce and record the effects of a procedurally different process was available.

Limitations

During the development of the project, a number of limitations were experienced: The available time frame for the research and analysis process was dependant on the

length of CSUSB Summer Session and Fall Quarter schedules and availability of STSC staff. With project research beginning during the 21-week "Summer Sessions", concepts, criteria and prototype templates had to be developed in time to coincide with the beginning of Fall Quarter. Student Technology Support Center (STSC) workshops typically become available during the seconds week of the quarter. The unanticipated loss of available STSC staff during the Summer Sessions shifted the testing phase to the beginning of Fall Quarter. This meant that a Design and Development process would have to be created in such a way that it could be achieved within the first two weeks of Fall Quarter, immediately followed by Implementation and Evaluation in the STSC Technology Workshops Series during these workshops. Also limiting the flexibility of the project was a pre-determined scope of workshop content based on established subject area choices.

Definition of Terms

The following terms are defined as they apply to the project.

Application: The computer program used to create learning materials- specifically, Microsoft Power Point.

Audience/Attendee: Individuals- usually students- who show up to attend the workshops.

Content: Information and other data to be included in the Presentation(s) and reviewed in the Workshop(s).

Presentation: A finished Power Point document.

Presenter: The individual leading the workshop. Also referred to as Trainer.

Staff: Student employees working in the Student Technology Support Center.

Subject Matter Expert: Individual(s)- typically working professionals- who exhibits high levels of expertise in performing a specialized job, task, or skill.

Template: A Power Point presentation, preset with content order and design elements ready for Staff to input content.

Trainer: The individual leading the workshop. Also referred to as Presenter.

Workshop: A live, small-group session in which a Presenter/Trainer reviews information and content, supported visually by a related PowerPoint presentation.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

Regular advances in technology allow education and private business many options in the distribution of training and instructional materials. Nevertheless, lectures and presentations visually supported with related content- are still the dominant format used to educate students and staff on simple and complex ideas. To suggest development standards based on learning styles or effectiveness of design in the learning process requires a duty to support these ideas.

While investigating techniques for the development of training materials, little evidence of established guidelines were found along these principles. However, a review of the related literature (Beaman, 1998; Knowles, 1984; Kraushaar & Shirland, 1985; McKay, 1999; Miller, 2003; Paas, Renkel, Sweller, 2003; Ramsden, 1992; Riding & Cheema, 1991; Smith, 1999; Sweller, 1988; Williams, Stimatz, 2005), provides supportive evidence of theories and processes that can be used for the development of training materials. The key areas addressed in this paper include an analysis of learning styles best suited for

adult learners, standards and common practices of design and development, and finally, incorporating Instructional Design methods to construct a development process that is easy to learn and repeat on a continual basis.

Cognitive Load Theory and Andragogy

Cognitive Load Theory

In developing instructional design, Paas, Renkel & Sweller (2003), consider the Cognitive Load Theory (CLT). Cognitive Load Theory proposes that learning happens best under circumstances that compliment the cognitive structural design inherent in all humans (Paas, et al, 2003). This design is illustrated through experimental research previously conducted by George Miller.

The results of Miller's research demonstrates that short-term memory is limited in the number of elements it can contain simultaneously (Miller, 2003). In turn, Sweller constructs a theory that treats combinations of elements, or schemas, as the cognitive structures that make up an individual's knowledge base (Sweller, 1988). These various structures outline the foundations of Cognitive Learning Theory.

The authors describe the different levels of cognitive learning- intrinsic cognitive load, extraneous

cognitive load, and effective cognitive load. They hypothesize that by using various techniques of introducing information based on CLT, adult learners' ability to remember content is affected (Paas, Renkel & Sweller, 2003). It is reported that for learning to improve by an instructional design, the design should reduce a need of conscious cognitive processing or working memory and allow learners to use newly learned material to add to prior knowledge (Paas, et al, 2003).

As each new cycle of information is presented based on previously acquired knowledge, over many cycles, very advanced knowledge and skills may be acquired. (Paas, Renkel & Sweller, 2003). Combined, these results confirm the hypothesis that by designing content that uses previous knowledge as a foundation, teachers and learners may skip the review of previous knowledge in subsequent lessons, allowing both teachers and learners to focus on how new content relates to the previous information.

Andragogy

Andragogy is a learning theory founded on assumptions about the characteristics of adult learners. Originally coined as early as 1833, this term did not gain validity until used by adult educator, Malcolm Knowles. Knowles provided a tangible foundation of Andragogy by linking it

to significant assumptions about adult learners that differentiate them from child learners (Smith, 1999). The basis of this learning theory stems from Knowles' findings:

> As a person matures...[H]is self concept moves...toward one of being a self-directed human being...[H]e accumulates a growing reservoir of experience that becomes an increasing resource for learning...[H]is readiness to learn becomes oriented increasingly to the developmental tasks of his social roles...[T]he motivation to learn is internal (Knowles 1984:12)...(Smith, 1999).

By shaping instructional content to meet these specific needs of adult learners, the effectiveness of instruction can result in better learning for adult learners.

Assessment

The more Andragogy is taken into consideration as a learning theory in the education community, the more debate that arises about its relevance in practice. A common result of the ideas presented by Andragogy is that traditional assessment and evaluation methods are often less effective in measuring the educational success of adult learners. Beaman (1998) examined the area of learning styles and assessment techniques suggested by

Andragogy. The results in this study indicated that while many adult learners frequently get high grades, dissatisfaction with how they earned them and "who… was responsible for determining evaluation criteria" was a common observation among adult students (Beaman, 1998, p. 49).

To test this hypothesis, students in the Beaman study were provided several alternate evaluation methods including Peer-Assessments and Self-Assessments. These alternate methods resulted in a statistically significant higher percentage of positive comments from students as they provided feedback on the course. One recognized limitation to this study was that while there are an unlimited number of possibilities for alternative evaluation methods, only a few were tested. It was also noted that there is not enough substantial research in this area to compare conclusions.

The internal debate over the validity of Andragogy and assessments is also described as a "catch-22 inherent within the very concept of Knowlesian andragogy" (Rachal, 2002, p. 221). This author continues with the critique that "effectiveness is largely determined by learner achievement which is often measured by tests and grades;

but for Knowles, tests and grades are anathema to the very idea of andragogy" (Rachal, 2002, p. 221).

While some articles question the validity of Andragogy as a learning theory, the idea that adult learners learn "differently" is consistent with the other articles mentioned in this paper. However, Andragogy in theory and in principle does not necessarily provide traditional assessment and evaluation methods to support it.

Design Standards and Cognitive Styles

To validate the need for standardization in the development process of instructional materials, another area to consider is that of effective visual design. Design standards and its effects on cognitive style is discussed by McKay, who suggested and tested the idea that learning performance is affected by "an interaction of cognitive style and instructional format..." (McKay, 1999, p. 324). The focus of these investigations was to determine the performance of adult learners with various learning styles to "test the effectiveness [of differing formats] for students learning complex computer programming concepts" (McKay, 1999, p. 325).

The author highlights the view from Ramsden's study (as cited in McKay, 1999) that "[while] traditional instructional materials are usually text-based, with directions given by a tutor to accompany the materials…" (McKay, 1999, p. 324), this format only benefits certain learning styles while doing a disservice to others. This view promotes the argument that students with differing learning styles receive a different amount of value from these events.

Pre-analysis showed that members of known learning styles responded differently to the different kinds of content. Discussed in this study were "Verbalizers" and "Imagers".

> Verbalizers prefer to have information presented as words or verbal associations. This type of learner can easily create mental images of the material being presented; therefore, they are comfortable with heavy text or verbal presentations. They may prefer to be presented with main points of the process. Imagers see things in the form of pictures and prefer material to be presented in vivid context. Unfamiliar terms should be descriptive and illustrated (Riding & Cheema, 1991, p. 193).

The results of this study supported the hypothesis. "Verbalisers" were found to learn best from "graphically enhanced instructional material…" while many adult "imagers" may learn[ed] best from text-only instructional material" (McKay, 1999, p. 334). A second experiment in this study included the distribution of text-only and text-plus-graphics materials. When added to text, graphical representations of material were shown to have a positive effect on learning outcome. The results also indicated that the traditional mix of text, lecture and student practice does not necessarily suit an "imagery-based" cognitive style (McKay, 1999).

McKay's research supports the idea that decisions in design and presentation of material can have a measurable influence on students of differing learning styles and should be taken into consideration when developing instructional materials for a broad audience.

Related to developing a framework for creating content, Williams and Stimatz' (2005) investigation of design theories provided further insight into effective layout and presentation order of content. The authors suggested that while consistent rules for good design have developed over time, these rules concentrate only on readability and ease of use and do not necessarily

consider established learning theories. While an interface that is easy for the user to read is extremely valid, their research sought to determine if established design rules actually facilitate measurable changes in the learning process (Williams & Stimatz, 2005).

Components of good design (as passed down through professional literature) include the avoidance of

- Heavy text (the number of words per line and liners per screen
- Non-standards typefaces
- Poor grammar
- Poor contrast

Designers should

- Use correct punctuation
- Mixed case letters
- Pastel or soothing colors
- Familiar metaphors
- Consistent colors and graphics

(Williams and Stimatz, 2005, p. 181)

The result of this investigation found that most widely held design principles date back to the earliest development of printed materials and marketing theories. The authors also found that few if any design principles

"tend to be based on the opinions of experts rather than on the results of empirical research" and suggested further research into how much commonly accepted design principles affect the learning process (Williams & Stimatz, 2005, p. 182).

Development and Rapid Prototyping

With learning theories as a foundation for the design, development, and production of content, the process of developing such content is a component naturally requiring investigation. Kraushaar & Shirland (1985) discuss methods of rapid prototyping an efficient development process. Kraushaar & Shirland demonstrated the effectiveness of the "state-transition model". This particular prototyping model is often used to reduce the time needed to create applications quickly and effectively in the development process of Information Systems.

In this example, a prototype was tested throughout the development process. Changes and additions to the "state" of the prototype occurred "on-the-fly" based on suggestions by the testers. The involvement of the intended target audience in the development process based on their expressed needs was vital to the end result of the design. In the end, the research conducted in this

study successfully showed the advantages of rapid prototyping methods.

Kraushaar and Shirland's (1985) examination of the rapid-prototyping development model documents the development of specific product- application systems. However, the concepts and processes in this study are easily applied to many development areas including that of instructional materials. The approach used in the study considers the final product- an operating system, as "the desired state that is achieved by passing through earlier, less desirable states" (Kraushaar & Shirland, 1985, p. 190). The authors further incidate that "the transition from one state to the next can be accomplished by the traditional development process of analysis, design, and implementation" (Kraushaar & Shirland, 1985, p. 190). With an emphasis on user involvement and rapid-prototyping, the authors conclude with an affirmation that "prototyping can provide on-time and within-budget systems for both large and small application projects" (Kraushaar & Shirland, 1985, p. 190).

One limitation to this particular study as it relates to the broader theme of this project is the fact that the end-user/participants- both the intended audience as well those involved in the development process, were known to

possess previous knowledge and a high-level skill set in this field. These characteristics are not necessarily representative of the typical staff developing a variety of technology-oriented workshops for this project.

While specifically addressing the development of applications systems, this study sufficiently outlines a few of the motives and typical outcomes in the rapid-prototyping development method of products whether they are software applications, tangible goods, or training materials. The authors suggest additional testing to determine a more clear understanding when this prototyping methodology would not be as effective.

Summary

The questions addressed in these studies are relevant to the main ideas of this paper: The development of instructional content should strive to meet the needs of the intended audience. Methods of providing standardization in the development of computer-based delivery should be established based on the goals of the courses and their intended audience. Consistency in the quality of content and delivery of computer-based training and delivery should be practiced in order to assure a high success rate in learners. Finally, techniques in the

development of materials are currently available to streamline the development cycle as well as address the varying degrees of expert knowledge by instructional designers. Taken together, the results of these studies support the idea that consistency in content and design are key components in the development of training programs for adult learners.

It can be assumed from a review of the literature that an understanding of typical learning styles of the intended audience is an asset toward achieving high-quality and relevant content; The design and development of content should incorporate design theories appropriate for the intended audience; Establishing a standardized development process will achieve consistency in the content created over time.

By developing a standardized process for the creation of computer-based instructional content, consistency in the quality of content and delivery in training programs can be achieved through the use of resources as simple as pre-designed templates or "wizards" whose structure is based on these concepts.

Future studies in this arena should investigate these areas within the framework of an established training program that incorporates these theories, and compare the

results, i.e., the overall learning, retention of content, and satisfaction of participants- with a training program that does not historically take these issues into account.

CHAPTER THREE

PROJECT DESIGN AND DEVELOPMENT

Introduction

This chapter will provide a detailed description of the design process for the development of this product. The design of the PowerPoint templates and how they incorporate design and learning theories will provide the reader with a comparison of the original model used in the Student Technology Support Center's Technology Workshops versus its updated and modified versions. A discussion of the theoretical issues will provide further insight into the resulting design, followed by an evaluation of the product. Finally, developer and audience surveys will provide an appraisal of the project, followed by an evaluation of possible revisions. This development of this project uses the ADDIE Model of Instructional Design as a foundation, but heavily incorporates methodologies of Rapid Prototyping in the design and development stages.

Development Process

Analysis

The intentions of this project originate from the opinion that in an ideal environment, entry-level content developers and trainers will have a foundation or

guidelines from which they can learn successful methods and techniques of developing instructional content. As a result, intended audiences should benefit from well-thought out and well designed content. These opinions originate and are supported through personal experience, familiarity, and related resources made available through several years of working in an IT Training environment equivalent to that which is discussed in this paper.

This experience has provided regular access to reliable, industry-supported resources, publications, and documents pertaining to the development of training materials and methods. Additional input is received through steady communications with instructors, designers, and learners of the training community. Focus groups, interviews, and daily interactions in real life and digital communications (i.e. listservs, forums, mailing lists, etc.) allow ample dicussion about these tasks and how well they work.

These encounters have also allowed abundant opportunities for the observation of people tasks with the development and delivering of these materials. Through these methods, (document recovery, focus groups and interviews, participant focus group and interview,

observation) these opinions can be supported in a way that is understandable and that someone else could replicate.

A need for such a resource was noted through several years of first-hand experiences and observations in a University-level technology-training environment as mentioned above. Technical support staff at the Student Technology Support Center at CSU San Bernardino provide various levels of support to its costumers. This includes the development of technology workshops. The support staff used in this project should benefit from the ability to create content in short timeframes with minimal effort. The purpose of this project was to develop a resource along these lines. Staff should be able to follow a specific process of establishing criteria, making content and design choices, and the presentation of the finished products. The key to such a process was to break down the task into a series of goals and procedures based on a defined set of standards. The desire to establish a logical process in the absence of such standards resulted in the development of the goals for this project.

The first goal of this project was to streamline and improve the development process of technology workshop materials. The second goal was to develop a standardized

method for training the development and support staff using these same materials.

Given the timeframe and limitations of the design and development phase, the creation of a template-based process seemed most appropriate in order to shorten the time needed for staff to gain the necessary skills and confidence to prepare and present workshops to small groups.

The intended audience for this project consisted of university students employed in the Student Technology Support Center at CSU San Bernardino. These student employees are charged with the task of developing and presenting technology-oriented workshops to other university students. With intertwined duties as Content Developers, Presenters, and/or Trainers, this student staff possessed varying levels of experience in these areas. While some were experienced in workshop development and desktop publishing, others were often still learning the applications they were hired to support and had no prior experience in developing instructional content in any way. Some of these student employees had little or no experience in presenting to groups or being "on the stage", while others were very comfortable in this setting.

As "Content Developers", staff are expected to create workshop content and materials on commonly used applications deemed valuable by a process extraneous to this particular project. As "Presenter/Trainers" they conduct 30-90 minute hands-on workshops on these applications in a training-lab setting. The training style used in this department incorporate the use of visuals via projected PowerPoint slides to support the content being discussed. Assessments are usually available to participants to measure how much they have learned or how well the material was covered. These assessments follow each workshop through an online, multiple-choice quiz format.

To address these issues, the resulting project described in this paper was able to provide developers:

- A method to choose which aspects of content areas are the most important to be reviewed.
- A method to choose what level of detail is best for each aspect of these content areas.
- Standards for content order, layout, etc. in the creation of these materials.

Additionally, this project was also intended to motivate student developers and presenters to gain these skills for personal advancement and increased career opportunities.

The anticipated problems in this project mostly concerned the target audience- the student staff. As a result of the hiring and scheduling process and previously mentioned quality-control issues, there was much disparity regarding experience, employment hours, and personal motivation of the STSC staff. A complimenting training process did not exist to help staff meet expectations for each staff person to demonstrate a certain level of proficiency in desired skills after a short period of time.

Time was also a significant factor. With limited hours and short shifts, development cycles had to remain fairly short in order to maintain a preferred level of interest and quality control among these employees. Acknowledgement of these issues was significant in the steps used in the development of this project.

Defining the most important aspects of computer-based presentation of educational content- in this case, as presented in the technology workshop format- was crucial in determining how to achieve this goal.

Defining the most important aspects of computer-based presentation of educational content- in this case, as presented in the technology workshop format- was crucial in determining how to achieve this goal.

The answers to these questions were acquired through a variety of analysis methods (document recovery, focus groups and interviews, participant focus group and interview, observation, etc.): By researching existing educational literature and trade publications on commonly used development processes; through interviews of experienced developers to determine what techniques, criteria, and design models they most often find success with; through interviews of experienced trainers to determine what techniques they feel are the most effective in teaching complex or difficult skills. Further investigation included analysis and "reverse-engineering" of successful- and not-so successful training workshop materials.

The information gathered through this process provided the best means of measuring the success of this project. Ideas such as how to quantify comments and confidence of staff and participants, consistency in format and design of content, consistency in presentation, as well as evaluation and assessment scores of participants were key questions developed through the research and interviews.

Two fundamental issues regarding affective computer-based training were found in a review of the

literature. First, that consistency in the quality of content and delivery of computer-based training is important to assure a high success rate in learners. Second, methods of providing standardization in the development of computer-based delivery should be established based on the goals of the courses and their intended audience.

To aid in determining a standard for "good content" and "good presentations", a professional Technology Trainer, the Professional Development Program Coordinator at CSU San Bernardino was interviewed. Questions in this interview addressed areas and issues concerning the selection and creation of "good content". Content order, presentation techniques, tips, and pitfalls were also discussed in describing what results in effective and interesting technology workshops.

The results of this interview suggest content which (briefly described), "orients the learner(s) to what the product or process does and its most common uses…", the basic and commonly used tools, and time-saving shortcuts, as well as many other content areas (Castillo, K. Personal Interview, April 2006). This interview also stressed the importance that presenters should have a good understanding and experience in the product(s) being

presented, since questions will always come up that are not included in the presentation.

Common issues surrounding the process of creating and meeting stated criteria, goals, timelines, etc. were discussed in an interview with an Instructional Media Project Coordinator currently developing online courses funded through a grant from the U.S. Navy. Examples of the data gathered through this interview include the importance of understanding "who is the target audience" and "what is their intent?" A significant factor pointed out during this interview was the need to spend "a considerable amount of time developing a navigation system [or template]" to facilitate rapid reproduction and consistency in design (Casadonte, M., Personal Interview, April 2006).

The success of this project was ultimately measured in a number of ways: Staff interest toward the development of workshops, the time needed to start and finish a workshop topic, how well the finished product meets the stated goals, the interest of those attending the workshops, and finally, how much information was learned by workshop attendees.

Interest in the assignments- the "projects"- by development staff was easily measured through regular

observation and attention to staff feedback. Development cycles were also easily tracked by a timeline created and updated in Excel. This timeline also provided development staff opportunities to make notes or comments to be used in the rapid-prototyping of the project. Reviewing and evaluating the content with a checklist measured the quality of completed projects.

The degree of learning was measured through post-workshop assessments completed by workshop attendees. Content developers also created these assessments. The most important measure of success, however, came directly from the workshop attendees and was evaluated in their opinions of the workshops.

The final project is a developer's resource, specifically, a series of Power Point "templates". An initial "Developer's Workshop" presentation was also created to outline and describe the purpose, strategy, and provide a short "how-to" on using the resource intended for the development staff. The Developer's Workshop utilizes a PowerPoint presentation that also serves as the example of a finished product. It is important to note that while the product of this project is a Microsoft PowerPoint template, the concepts and methods used in this project are easily applicable to similar presentation

applications such as Keynote (Apple), Captivate (Adobe/Macromedia) and Presentation (Corel).

Design

Design Process

A document developed in Power Point was chosen as the format of this project in order to allow student employees to utilize any existing skills with minimal training on the applications itself. Based on the guidelines of good design and good content, and as a result of the research, key decisions in creating a design process were considered:

- To create a "roadmap" of product development, a Development Flowchart depicting each element of product development was chosen. Since the final product would in itself be a template, this would avoid confusion as well as allow for processes in the development process to be focused on without distraction from other elements. The flowchart would provide developers with a graphical representation of course development to simply the workflow process.(See Appendix A, Figure 1.).

- To reduce the opportunity of "bad" design choices, a checklist of "good design" criteria was created for developers to adhere to while allowing content developers some freedom in regard to a variety of design elements. This criterion was a result of the literature and other resources' common elements of good design. (See Appendix A, Figure 2.).
- Content developers would also be given some flexibility in regard to content. While elements of good content were harder to develop given the variety of subject areas, a Workshop Content Checklist established a guideline and details were often provided by SMEs. (See Appendix A, Figure 3).
- While the resulting checklists were a product of research and "reverse-engineering" successful workshops, the analysis and integration of learning styles was also a key component in determining which areas to address or skip over.
- An "assessment creation tool" was an important component of the product. The appropriate content should always "throw up a flag" i.e.

emphasize what is "important enough to be tested on" without being obvious. The assessment should reflect these areas. (Castillo, 2006)

- Completed workshops were checked for accuracy and application of established criteria before being considered "complete". The template was created in such a way that it should be difficult for developers to miss these points.

Design Specifications

The final product allowed developers to stick to design specifications as much as possible while still allowing them room for personal creativity. The specifications that guided development include the following Design Rules as supported by the project goals and literature:

1. Format/Medium

   The final product will be a PowerPoint template. PowerPoint is accepted as an established supplemental resource to lectures and presentations and developers and workshop attendees should already be familiar with it.

2. Presentation Style

Developers will have the option of utilizing "Formal" or "Informal" presentation styles as relevant to the workshop content and audience. Options should be reflected in the variety of available templates. (See Appendix A, Figure 4-6).

3. Time/Length

Target time for these presentations will be 30, 50, and 90-minute presentations to coincide with typical scheduling of CSUSB classes. Allowing for planned and unplanned breaks & questions, in "real time" these time limits will be the equivalent of 30, 60, and 120-minute presentations.

4. Design/Font/Graphics

A Design Style Guide will be available for developers to follow and should be relevant to the workshop content as well as allow for variety. These style guides are constructed based on suggestions and observations as described in the literature. (See Appendix A, Figure 7).

5. Compatibility

The final presentations should run on Macintosh and Windows operating systems using Microsoft PowerPoint 98 (Macintosh) and 2000 (Windows) and newer versions.

Completed presentations should also as comply with ADA guidelines as they relate to accessibility of educational content at the University level.

Development

The prototype project was constructed using Microsoft PowerPoint and also employed the use of hand-drawn flow-charts as mentioned in the Design section of this paper. Layout and navigational elements were based primarily on established design elements used by the Power Point program. These elements were edited and modified as needed based on design guidelines addressed in a review of the literature. Additional content such as instructions, handouts, etc. were created and saved as Microsoft Word and/or PDF documents. (See Appendix A, Figure 8-10)

Implementation

Implementation of the project began first with an informal dialogue with the student staff of the Student Technology Support Center at CSU San Bernardino. This dialogue was a brief overview of the intentions of the project and an invitation to participate on a voluntary basis. Based on IRB guidelines, participation would be voluntary and have no effect on the employment status of the STSC staff. After this discussion, participating STSC

staff were issued part one of a two-part survey (See Appendix B, Table 1). The goal of this first survey was to gather initial viewpoints and opinions of the current workshop creation and presentation process. These responses were recorded and compiled. (See Appendix B, Table 2).

Staff were then presented with a "Content Developers' Workshop". This workshop consisted of a step-by-explanation of the development process and how to use the (prototype) presentation template. This workshop also incorporated a presentation that was created using the same template that would be used in the development process of future workshop resources. (Appendix A, Figure 11-13).

Having an understanding the goals of the project and seen a completed presentation, staff were then tasked with updating existing workshop presentations using this resource. Each staff member was assigned a separate topic and worked independently. By using existing content from previous workshops resources, the staff could focus on the input process without much regard to the content. Employees were welcome to choose between a limited set of Style Guides, but were required to adhere to the style they chose. Style Guides were developed based on concepts

of visual design and learning theory based on the research and reflected a compromise of the two different prominent learning styles (Verbalizers, Imagers) based on the content and expected audience.

Incorporating Rapid Prototyping techniques during the development process, staff were encouraged to share input on all aspects of development as needed. These observations would shape the direction of the presentation template and creation process through comments, observations and suggestions. Suggestions were scrutinized against the chosen set of criteria (Appendix B, Table 3). As each new version of the presentation was near completion, it was checked for adherence to the style guide using a checklist, and further checked for accuracy by the appropriate Subject Matter Experts.

Evaluation

Upon completion of the Powerpoint document(s) to be used in the workshops, the STSC Staff was issued a follow-up survey regarding the development process of these instructional materials (See Appendix B, Table 4). While similar to the first survey, the goal of this second survey was to gather viewpoints and reactions to the workshop creation process using the product of this

project. These responses were recorded and compiled (See Appendix B, Table 5).

Additional evaluation came from workshop attendees. Following each workshop, attendees were invited to complete a short survey to record their opinions of the workshop. The questions contained in the post-workshop survey addressed areas of content, design, and general (perceived) effectiveness (Appendix B, Table 6). These responses were recorded and compiled (See Appendix B, Table 7).

The prototype presentation template went through constant revision during the Development stage. In the Implementation and Evaluation stages, considerations for changes were based on staff and audience comments. Revisions to the prototype were also created as a result of survey comments received at the end each workshop and would be used to develop additional presentations.

At the end of the "week four" of the Winter Quarter, approximately three (3) revisions were made to the prototype presentation template and used in three (3) technology workshops at which time a final template was chosen. This template would be used to update existing workshops as well as create new ones (See Appendix A, Fig. 14.)

Summary

In summary, the Technology Workshops Template designed for this project enabled STSC staff to easily and quickly create presentation materials for the technology workshops offered by the Student Technology Support Center at CSUSB. Workshop participants- i.e., the audience- were exposed to a consistent and high-quality series of technology workshops. The development and implementation of this project went primarily as expected. It was found that while participants who rated themselves lower in the areas of understanding, skill, experience, etc. in the pre-survey, consistently found the use of the template model as a significant aid in the development process.

However, an unexpected outcome of this project came about from those participants who initially rated themselves highly competent and comfortable in the development process using PowerPoint. Comments from these participants showed a lack of understanding of the underlying purpose of the template (to initiate guidelines, etc.) and tended to address issues regarding the actual content that was supplied to them from SMEs.

Nonetheless, the goals of this project, to streamline the process of content development in order to increase quality of workshops had been achieved.

Future adjustments may include further revision of the template and/or scope of content addressed in the workshops based on continued feedback.

CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

A PowerPoint template and associated workflow procedures and quality control processes were designed for the STSC Training Lab staff and used in the development and updating of technology workshops intended for CSUSB students. The template required minimal time in understanding how to use it while allowing the content input process to be as equally simple. In an effort to increase its' effectiveness for its intended audience, the template incorporated elements of visual design theory and learning theory as it relates to adult learners.

The use of design "templates" increased the degree and quality of services made available to students through Academic Computing and Media's Student Technology Support Center ("STSC") at CSU San Bernardino. First, it allowed student staff of diverse levels of technical experience and educational backgrounds to create good quality and effective presentations with minimal training and in short timeframes. Second, the template-based development process allowed for an increase in the number and variety of workshops available to the CSUSB student population.

These templates supported established theories regarding learning styles and effective visual design. Third, the decrease in difficulty of the creation process allowed STSC staff to shift focus on acquiring more skills in the presentation and small-group communication aspects of the job requirement. Combined, the effects of this project resulted in a broader role in the support the STSC can provide technology support to the CSUSB community. The integration of these components supported the significant needs of the university in the areas of technology support for its students.

The results of this research demonstrates that the template process is far more beneficial for those with less experience or less confidence in their skills in the development process, and that a more concise explanation and demonstration of how the product is to be used should be considered for more experienced users of PowerPoint and similar applications.

Conclusions

The conclusions extracted from the project follows.

1. A standardized method of content creation provides consistency in the development process of technology workshop materials.

2. Consistency in the development process of technology workshop materials allows for the creation of a wider variety of workshops in short timeframes.
3. The development of content guidelines based on learning styles and design theory results in more effective presentations.

Recommendations

The following recommendations are relevant to any person wishing to create one or more PowerPoint presentations as a supplement to a real-time, real-life instructional sessions:

1. Further research is recommended concerning the effectiveness of computer-based instruction.
2. Standardized methods of content creation- whether or not they are based on scholastic research- should be documented and encouraged in industries that rely on these technologies to educate or train their staff.
3. An analysis should be reviewed to measure "consistency versus flexibility" in the development process of technology workshop materials.

4. The development of technology workshops should always start with an analysis of the needs of the intended audience.

Implications for Future Research Projects

Future research should explore those areas deemed important in this work. These include continued analysis of learning theories as it relates to adult learners, the educational effectiveness of visual design theories, and development options for computer-based educational content. A close look should also be taken at the effectiveness of the presentation design developed in this project in comparison with other or previous technology workshops.

Summary

The results of this project demonstrate that in lieu of a current lack of educational standards in the development of computer-based instructional material, specifically, PowerPoint presentation documents, resources for evaluating and developing such standards at a scholastic level currently exist within a carefully guided review of the literature. By utilizing understandings of learning and visual design theories, combined with established instructional design methods (such as the

ADDIE model and Rapid-Prototyping), a development process can be achieved to streamline the creation of instructional content while maintaining consistency and quality in the content created.

APPENDIX A

FIGURES

Figure 1

Development Flowchart

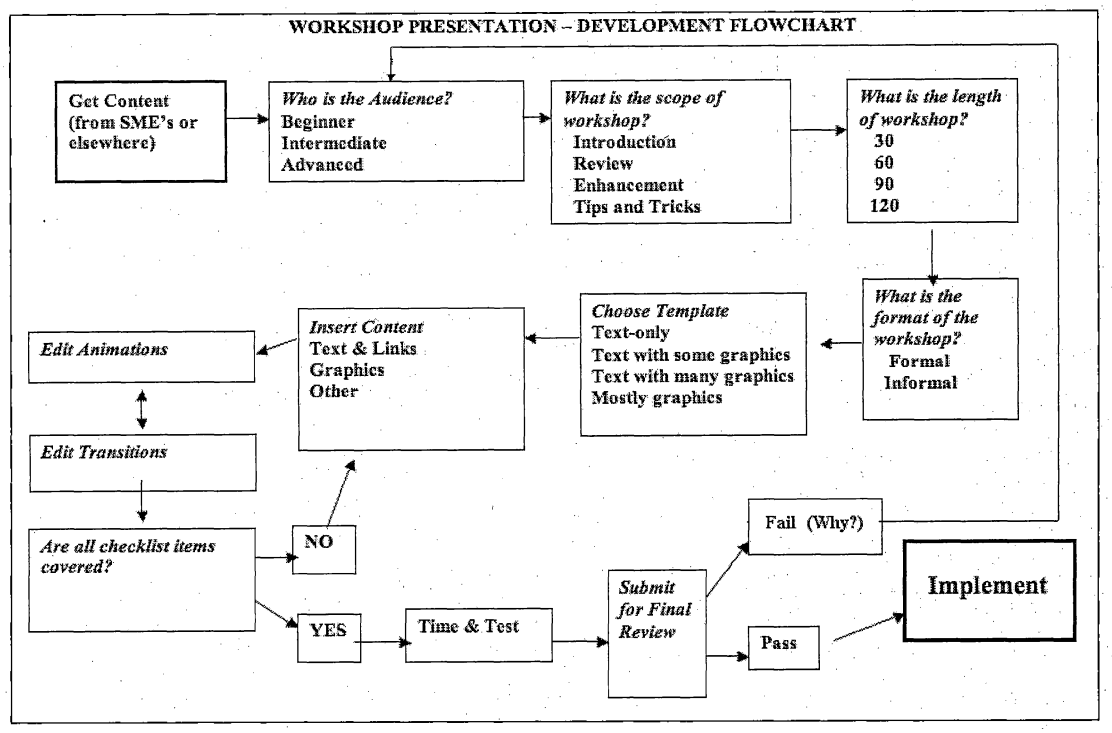
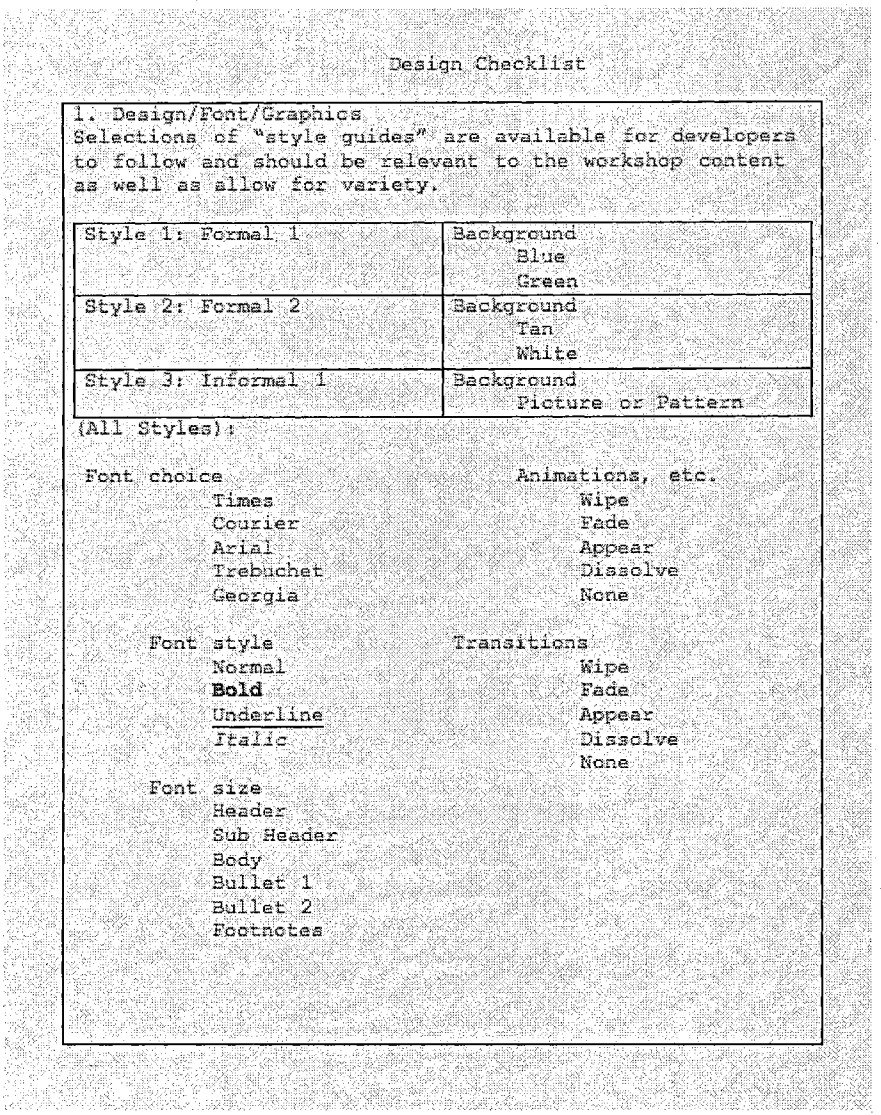


Figure 2

Design Checklist



Design Checklist

1. Design/Font/Graphics
Selections of "style guides" are available for developers to follow and should be relevant to the workshop content as well as allow for variety.

Style 1: Formal 1	Background Blue Green
Style 2: Formal 2	Background Tan White
Style 3: Informal 1	Background Picture or Pattern

(All Styles):

Font choice
- Times
- Courier
- Arial
- Trebuchet
- Georgia

Font style
- Normal
- **Bold**
- Underline
- *Italic*

Font size
- Header
- Sub Header
- Body
- Bullet 1
- Bullet 2
- Footnotes

Animations, etc.
- Wipe
- Fade
- Appear
- Dissolve
- None

Transitions
- Wipe
- Fade
- Appear
- Dissolve
- None

Figure 3

Workshop Content Checklist

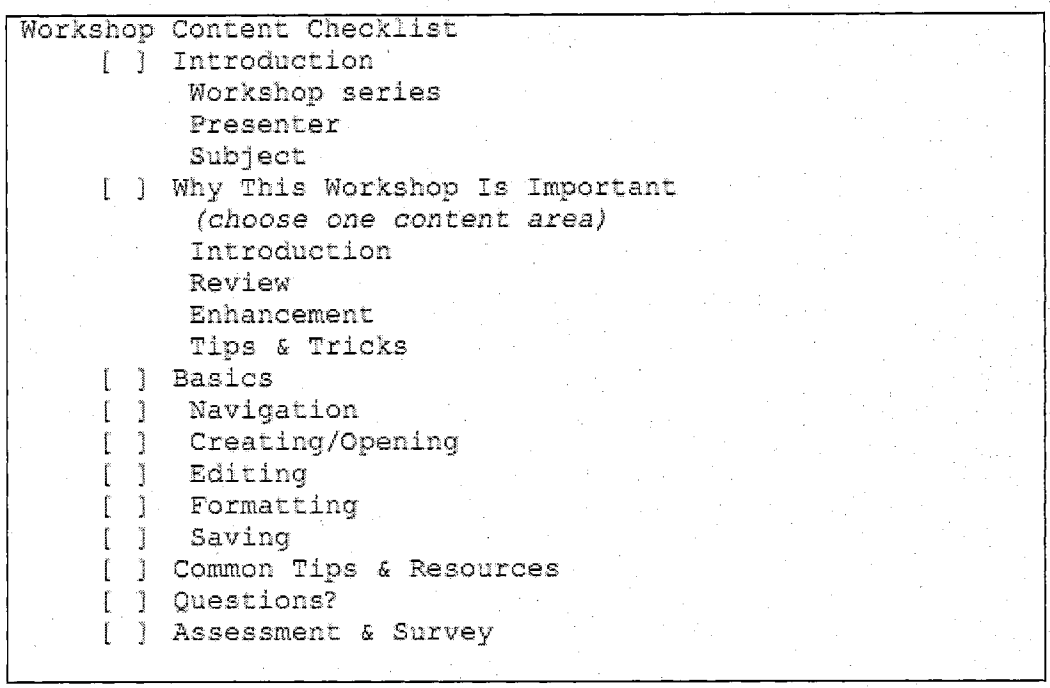


Figure 4

Example Formal Template 1

Figure 5

Example Formal Template 2

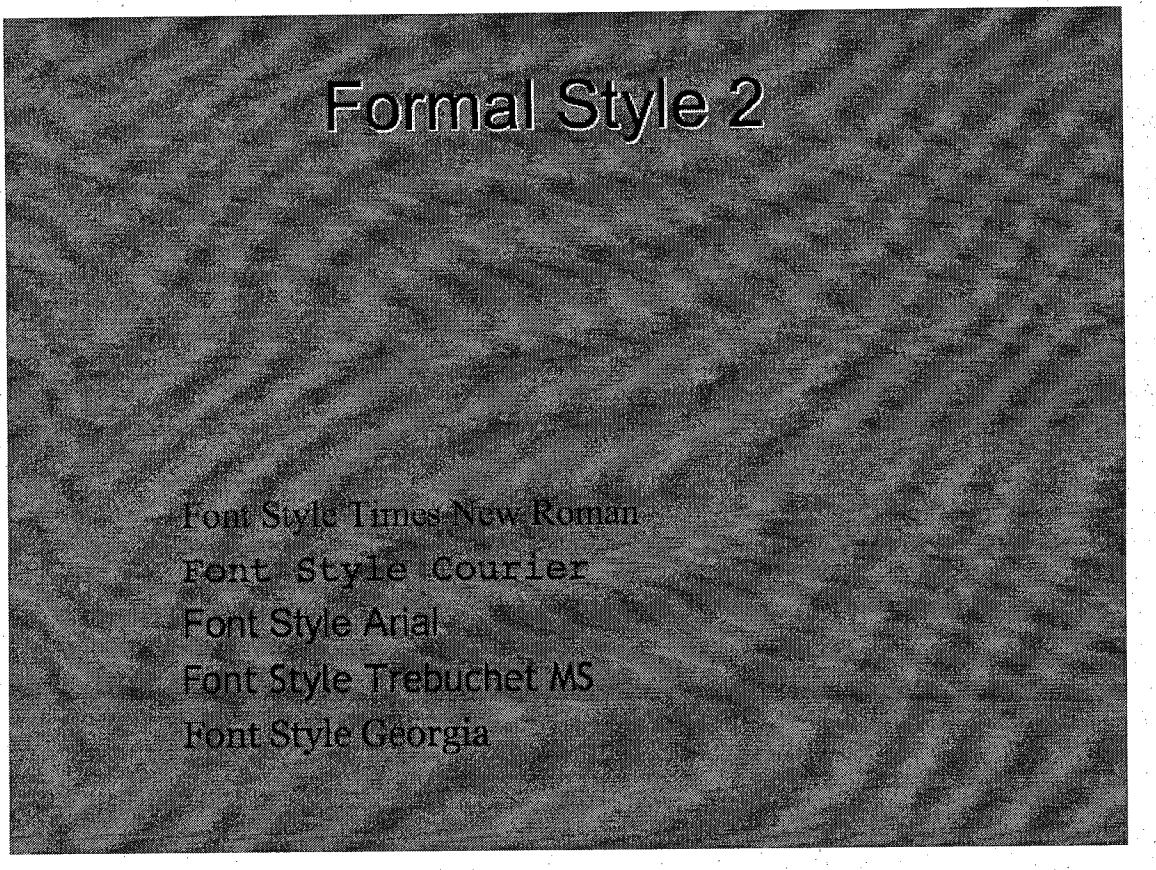


Figure 6

Example Informal Style 1

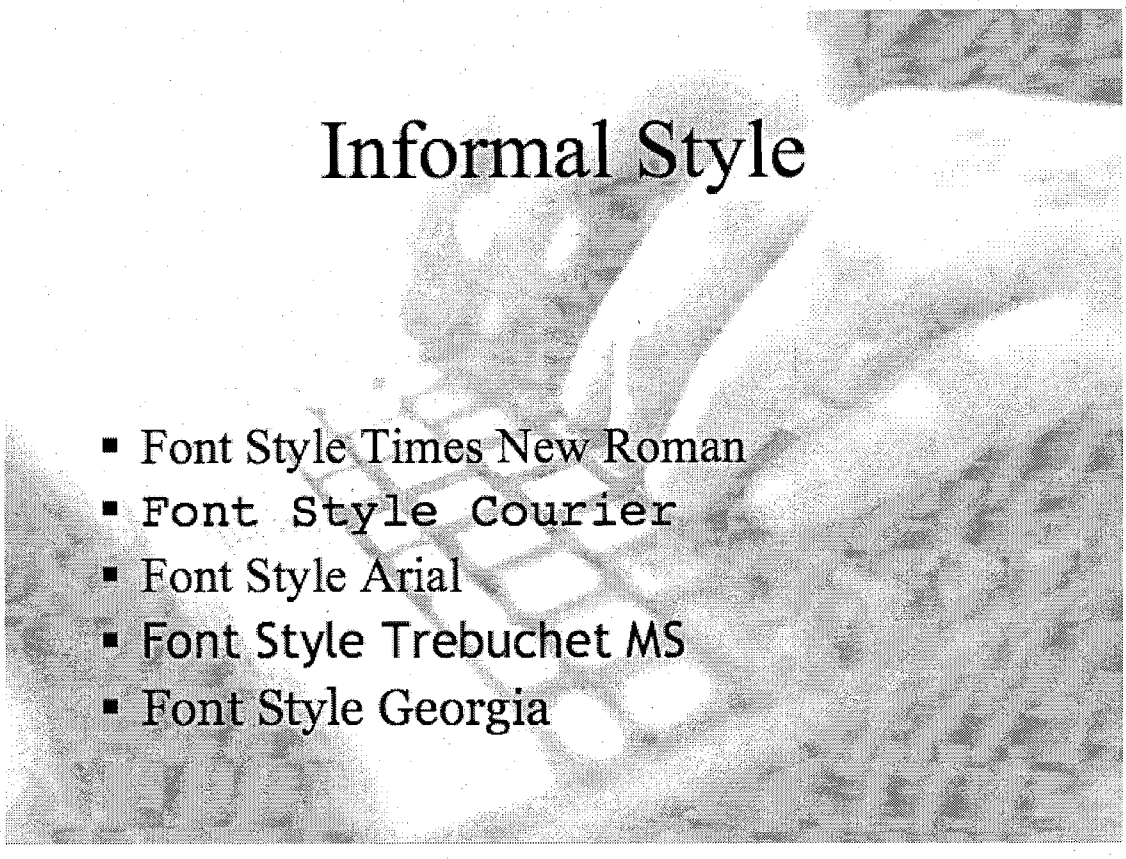


Figure 7

Design Style Guide

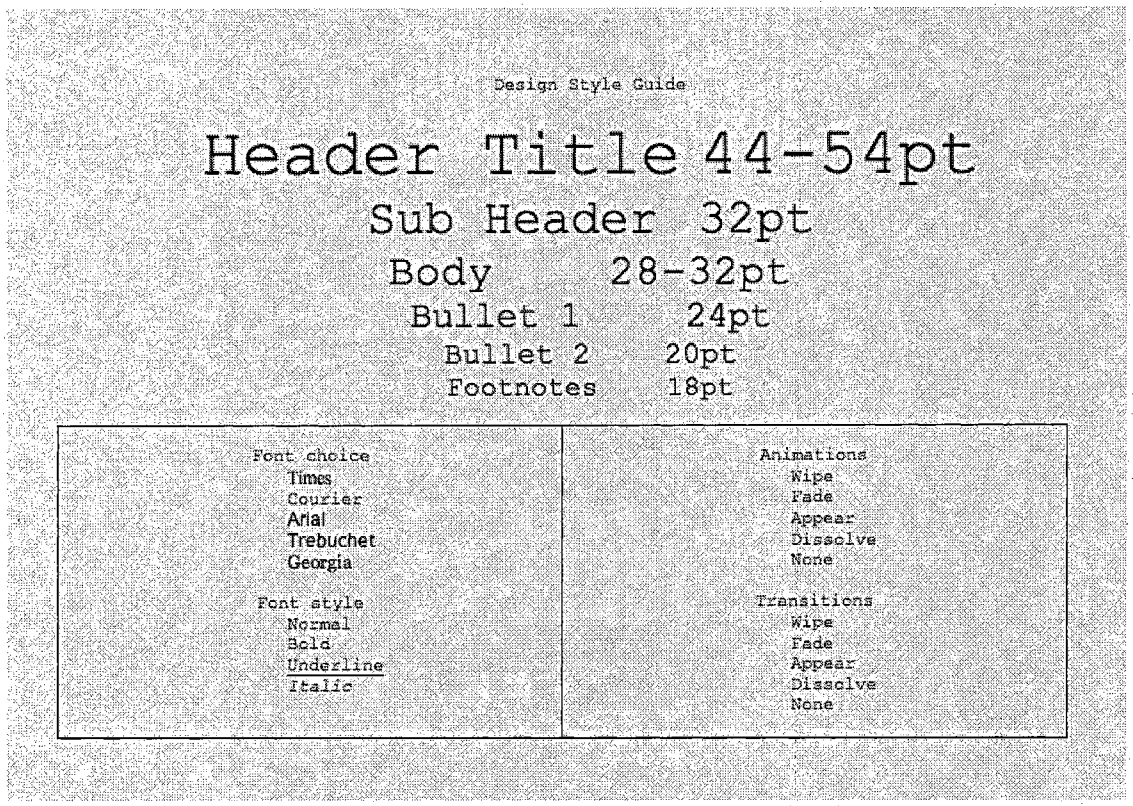
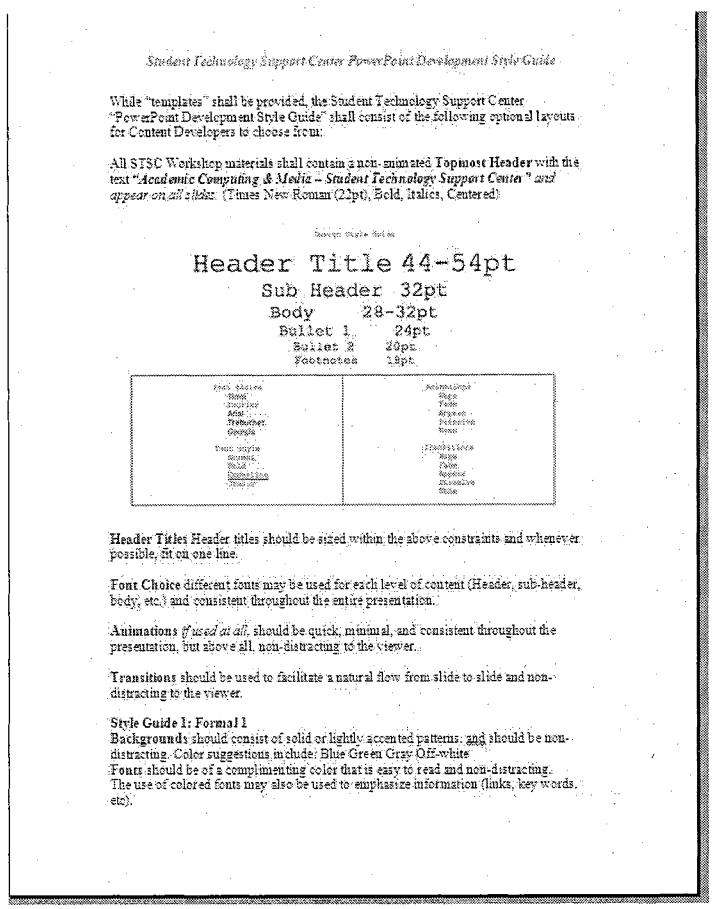


Figure 8 Instructional Handouts

(Development Style guide Page 1)



Student Technology Support Center PowerPoint Development Style Guide

While "templates" shall be provided, the Student Technology Support Center "PowerPoint Development Style Guide" shall consist of the following optional layouts for Content Developers to choose from:

All STSC Workshop materials shall contain a non-animated **Topmost Header** with the text *"Academic Computing & Media – Student Technology Support Center"* and appear on all slides. (Times New Roman (22pt), Bold, Italics, Centered)

Header Title 44-54pt

Sub Header 32pt

Body 28-32pt

Bullet 1 24pt

Bullet 2 20pt

Footnotes 18pt

Header Titles Header titles should be sized within the above constraints and whenever possible, fit on one line.

Font Choice different fonts may be used for each level of content (Header, sub-header, body, etc.) and consistent throughout the entire presentation.

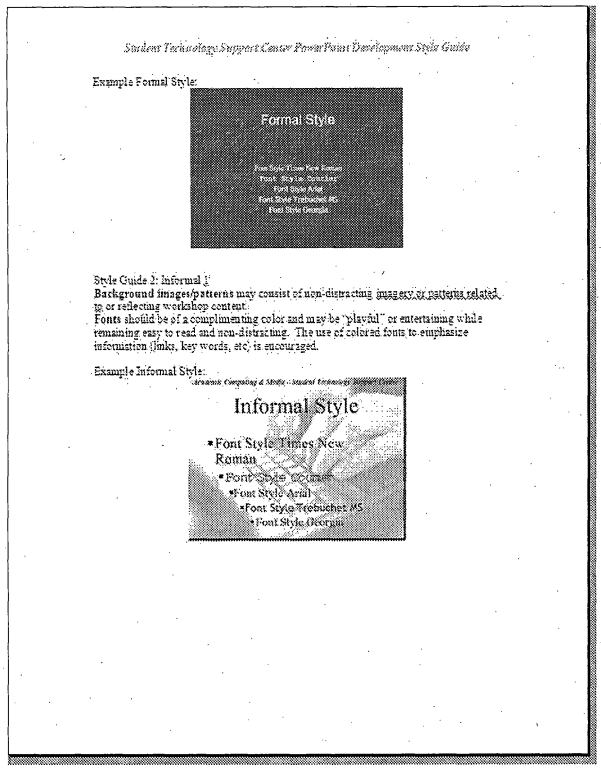
Animations *if used at all*, should be quick, minimal, and consistent throughout the presentation, but above all, non-distracting to the viewer.

Transitions should be used to facilitate a natural flow from slide to slide and non-distracting to the viewer.

Style Guide 1: Formal 1
Backgrounds should consist of solid or lightly accented patterns, and should be non-distracting. Color suggestions include: Blue Green Gray Off-white
Fonts should be of a complimenting color that is easy to read and non-distracting. The use of colored fonts may also be used to emphasize information (links, key words, etc).

Figure 9 Instructional Handouts

(Development Style guide Page 2)



Student Technology Support Center PowerPoint Development Style Guide

Example Formal Style:

Style Guide 2: Informal :

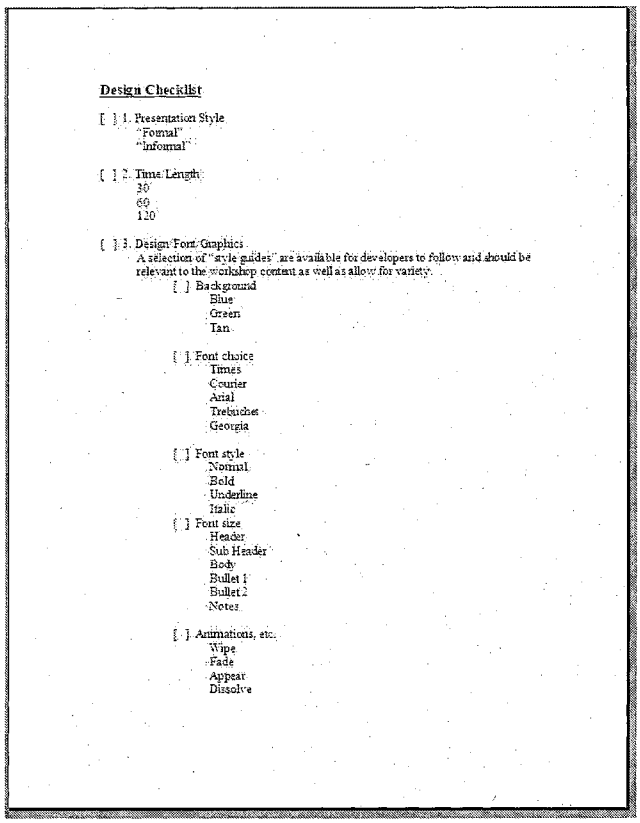
Background images/patterns may consist of non-distracting imagery or patterns related to or reflecting workshop content.

Fonts should be of a complimenting color and may be "playful" or entertaining while remaining easy to read and non-distracting. The use of colored fonts to emphasize information (links, key words, etc) is encouraged.

Example Informal Style:

Figure 10 Instructional Handouts

(Design Checklist)



Design Checklist

[ ] 1. Presentation Style
- "Formal"
- "Informal"

[ ] 2. Time Length
- 30
- 60
- 120

[ ] 3. Design Font/ Graphics
A selection of "style guides" are available for developers to follow and should be relevant to the workshop content as well as allow for variety.
- [ ] Background
  - Blue
  - Green
  - Tan
- [ ] Font choice
  - Times
  - Courier
  - Arial
  - Trebuchet
  - Georgia
- [ ] Font style
  - Normal
  - Bold
  - Underline
  - Italic
- [ ] Font size
  - Header
  - Sub Header
  - Body
  - Bullet 1
  - Bullet 2
  - Notes
- [ ] Animations, etc.
  - Wipe
  - Fade
  - Appear
  - Dissolve

Figure 11

(Example Slide, Developers' Workshop)

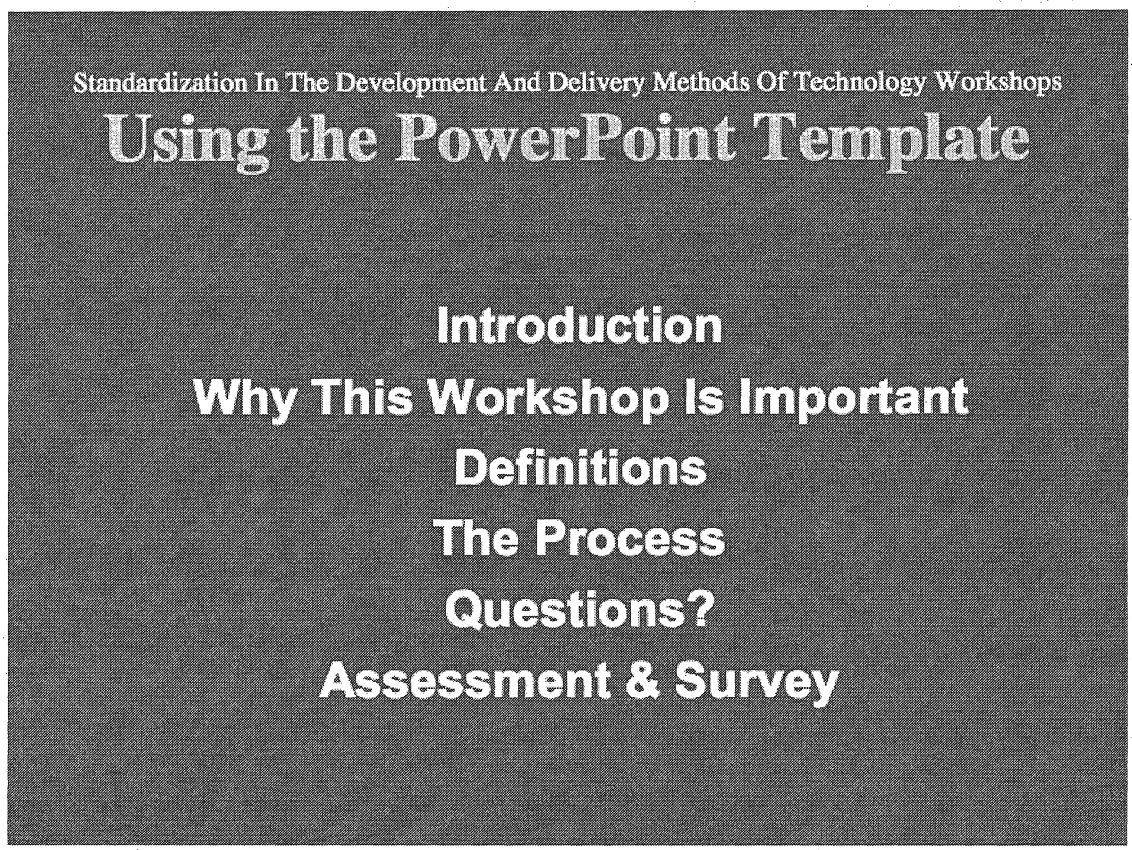


Figure 12

(Example Slide, Developers' Workshop)

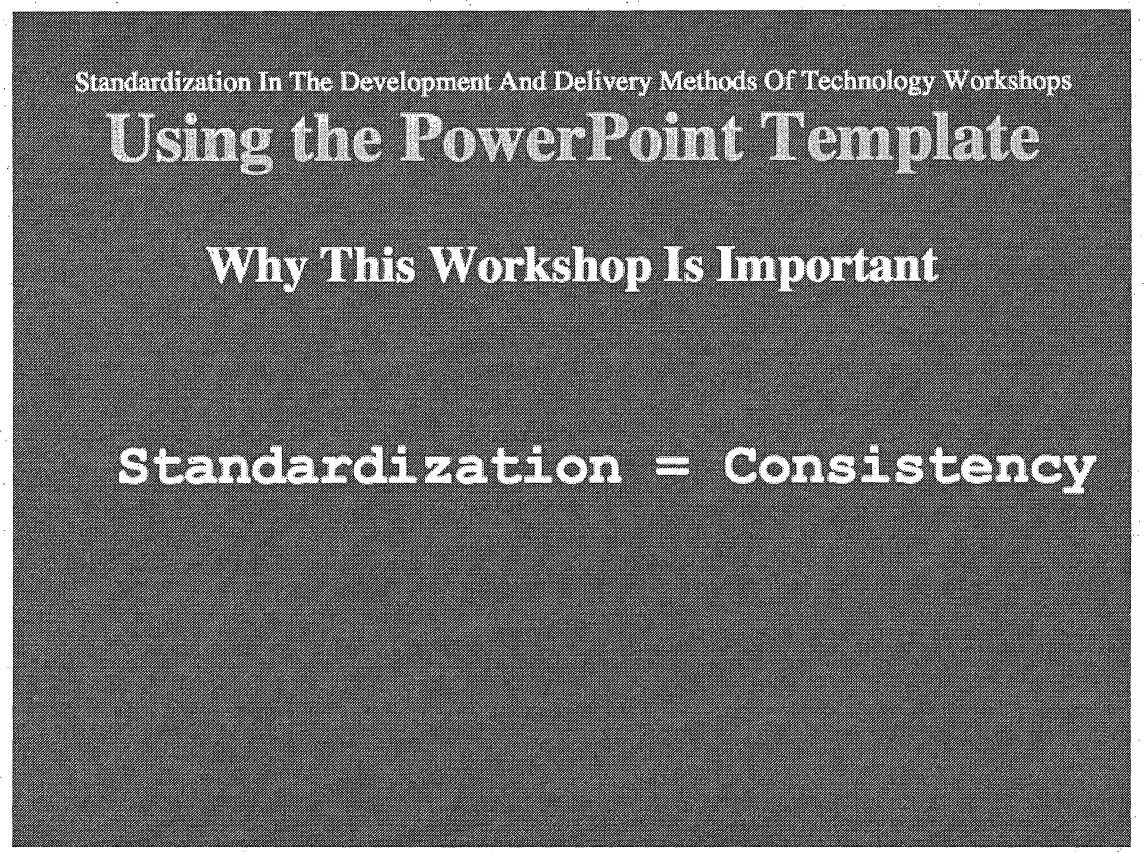


Figure 13

(Example Slide, Developers' Workshop)

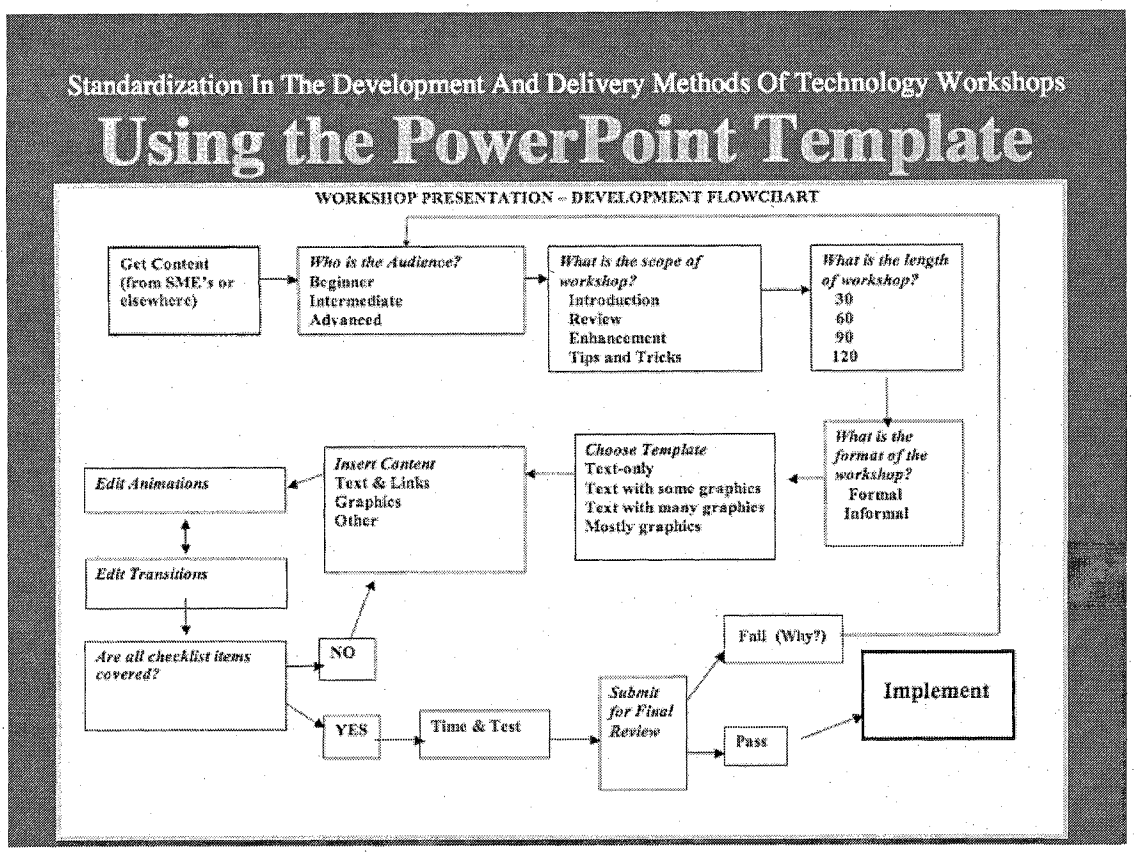
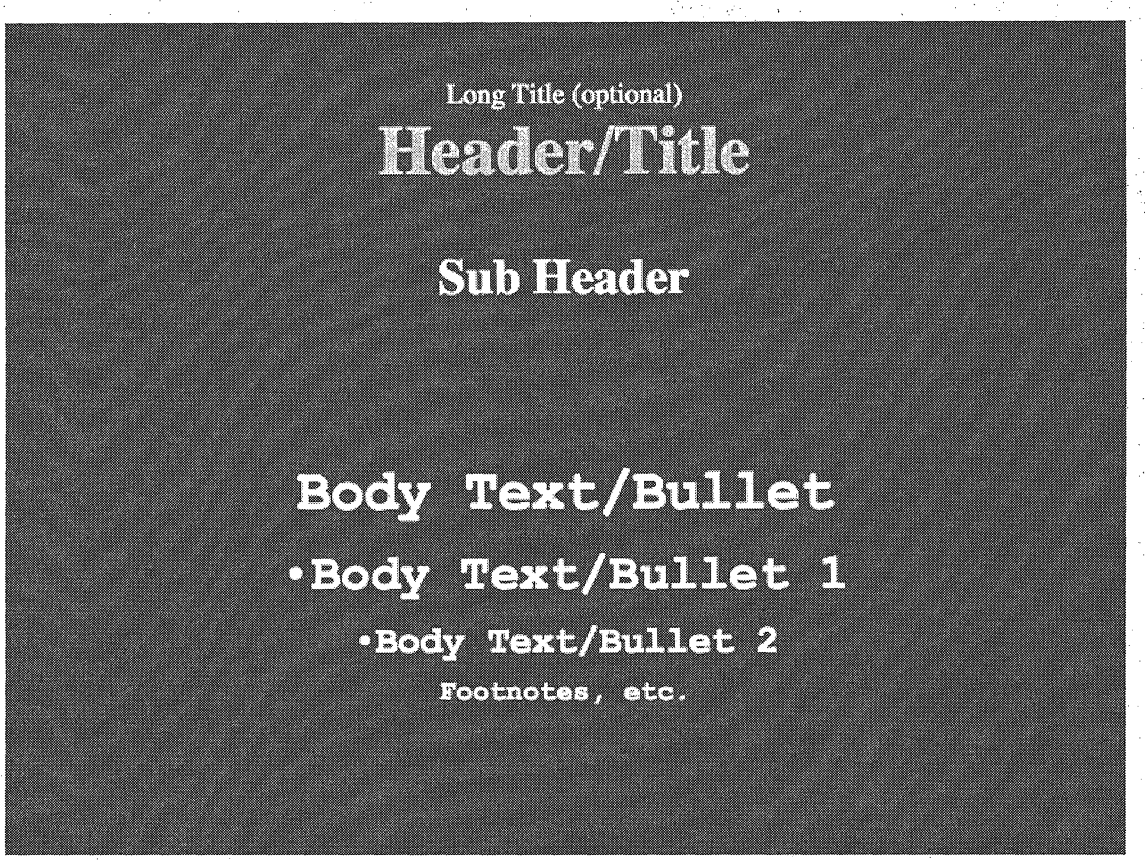


Figure 14

(Example Slide, Final Template)



APPENDIX B

TABLES

Table 1

Instructional Designer/Developer Survey Part 1

QUESTIONAIRRE/SURVEY A:
(Presented to Content Developers/Instructional Designers)

SURVEY A: Content/Instructional Designers, Part One (pre-workshop and demo project)
Thank you for participating in this survey. The time required to complete this survey is estimated to be less than 10 minutes. The purpose of this survey is to collect information from participants regarding the creation of instructional materials in a computer-based format (such as Power Point) to better understand how the creation of instructional materials in this format can meet the needs of students. This survey is anonymous.

Please rate your **current experience level** in developing presentations for classes or other demonstrations using applications such as PowerPoint:

1- No experience
2- Very little experience
3- Some experience
4- A lot of experience
5 - A whole lot of experience

Please rate your **current comfort level** in developing presentations for class or other demonstrations using applications such as PowerPoint:

1- Not at all comfortable
2- Slightly comfortable
3- Generally comfortable
4-Very comfortable
5- Extremely comfortable

Please rate how well **you understand the purpose** of presentation applications such as Power Point:

1- I do not understand at all
2- I understand a little
3- I generally understand
4- I understand for the most part
5- I completely understand

Please rate how well **you understand the process** of creating presentations using applications such as Power Point:

1- I do not understand at all
2- I understand a little
3- I generally understand
4- I understand for the most part
5- I completely understand

Please provide any suggestions or additional comments concerning the creation of presentations using applications such as Power Point (fill in the blank)

Table 2

Instructional Designer/Developer Survey Part 1, Responses

Responses Go Here

Question	R#1	R#2	R#3	R#4	R#5
"…current experience level…" (1-5)	5	3	2	4	0
"…current comfort level…" (1-5)	5	2	3	3	
"…understand the purpose…" (1-5)	5	4	4	5	
"…understand the process…" (1-5)	5	4	3	4	
additional comments					

"R #__" = "respondent number"

Table 3

Rapid Prototyping Timeline and Comments

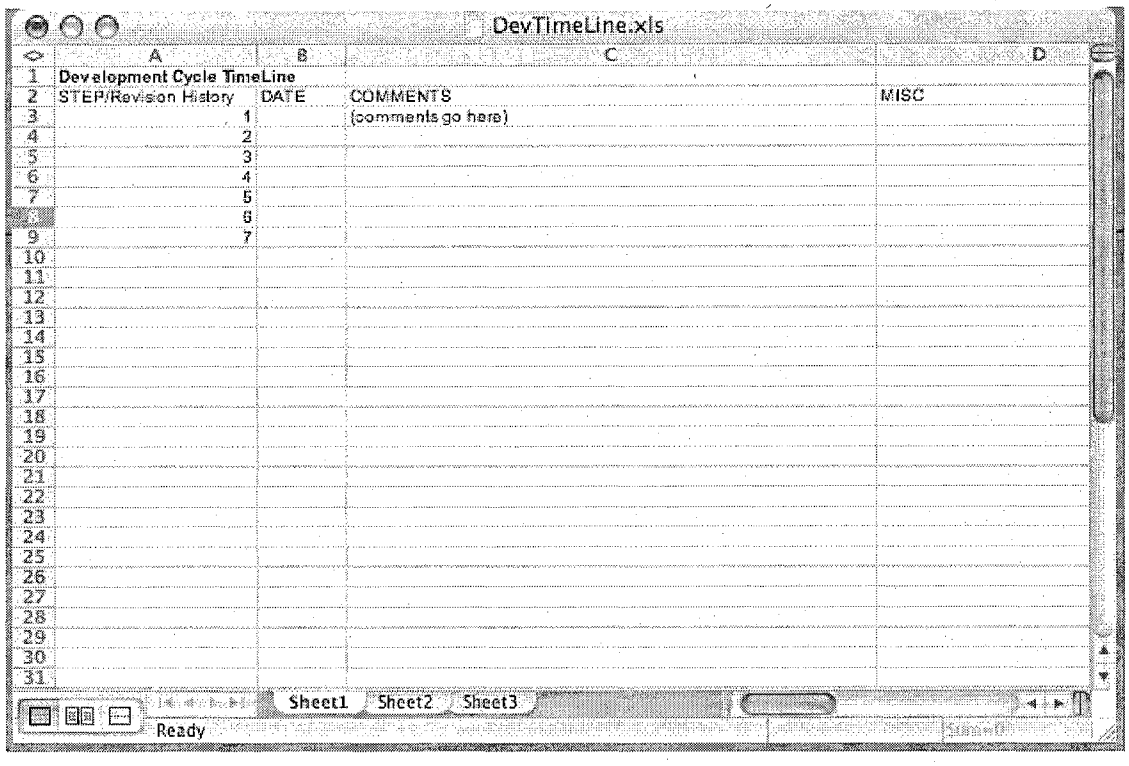


Table 4

Instructional Designer/Developer Survey, Part Two

QUESTIONAIRRE/SURVEY B:
(Presented to Content Developers/Instructional Designers)

SURVEY B: Content/Instructional Designers, Part Two (post workshop and demo project)
Thank you for participating in this survey. The time required to complete this survey is estimated to be less than 10 minutes. The purpose of this survey is to collect information from participants regarding the creation of instructional materials in a computer-based format (such as Power Point) to better understand how the creation of instructional materials in this format can meet the needs of students. This survey is anonymous.

After participating in the "PowerPoint Template Workshop Demonstration"...
Please rate how well you **understand the purpose of the presentation/Power Point Template** for developing presentations for class or other demonstrations:

1- I do not understand at all
2- I understand a little
3- I generally understand
4- I understand for the most part
5- I completely understand

Please rate how well you understand **how to use of the presentation/Power Point template** for developing presentations for class or other demonstrations:

1- I do not understand at all
2- I understand a little
3- I generally understand
4- I understand for the most part
5- I completely understand

1. Please rate **how comfortable you feel about using** the presentation/Power Point template for developing presentations for class or other demonstrations:
   1- Not at all comfortable
   2- Slightly comfortable
   3- Generally comfortable
   4- Very comfortable
   5- Extremely comfortable

By using this template, do you feel the design of final product is better or worse than if you created it independently? (Yes or No)

By using this template, do you feel the content of final product is better or worse than if you created it independently? (Yes or No)

Please provide any suggestions or additional comments concerning the presentation/Power Point template (fill in the blank)

Table 5

Instructional Designer/Developer Survey, Part Two

Responses

Reponses Go Here

Question	R#1	R#2	R#3	R#4	R#5
"…understand the purpose…" (1-5)	4	4	5	0	0
"…understand how to use …" (1-5)	4	4	5		
"…rate **how comfortable …" (1-5)**	3	4	5		
"…feel the design of final product is better or worse …" (1-5)	b	b	w		
"…you feel the content of final product is better or worse…"	n/a	b	w		
additional comments					
"R #__" = "respondent number"					

Table 6

Workshop Attendee Survey

QUESTIONAIRRE/SURVEY B:

SURVEY C: Student/Workshop attendees (this is survey is to be administered to workshop participants following the conclusion of a workshop)
Thank you for participating in this survey. The time required to complete this survey is estimated to be less than 10 minutes. The purpose of this survey is to collect information from participants regarding the creation of instructional materials in a computer-based format (such as Power Point) to better understand how the creation of instructional materials in this format can meet the needs of students. This survey is anonymous.

Please rate how well **you understand the content** presented in this workshop:
1- I do not understand at all
2- I understand a little
3- I generally understand
4- I understand for the most part
5- I completely understand

Please rate how well **the presenter understood the content** presented in this workshop:
1- He or she did not understand at all
2- He or she understood a little
3- He or she generally understood
4- He or she understood for the most part
5- He or she completely understood

Please rate how well **the presenter stimulated interest** in this workshop:
1- He or she did not stimulate interest at all
2- He or she stimulated interest a little
3- He or she generally stimulated interest
4- He or she stimulated interest for the most part
5- He or she completely stimulated interest

Please rate how well **this workshop covered the expected content areas**:
1- This workshop did not cover the expected content areas
2- This workshop covered the expected content areas a little
3- This workshop generally covered the expected content areas
4- This workshop covered the expected content areas for the most part
5- This workshop completely covered the expected content areas

Would you attend another workshop held by this department or instructor? (Yes / No)
Would you recommend this workshop to a friend or colleague? (Yes / No)
Please provide any suggestions or additional comments concerning this workshop. (Fill in the blank)

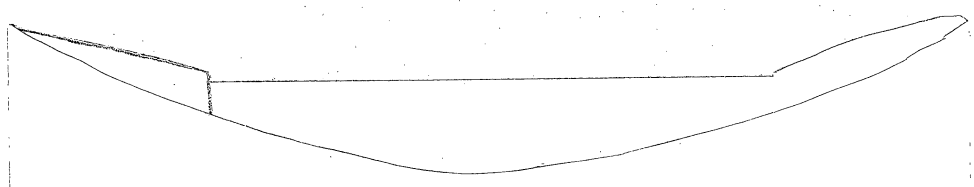
Table 7

Workshop Attendee Survey Responses

Responses Go Here	
Question	Response*
"…**how well you understand the content…**"	4.5
"…**how well the presenter understood the content…**"	5
"…how well **the presenter stimulated interest…**"	5
"…how well **this workshop covered the expected content areas…**"	5
**Attendee Responses (averaged)*	

APPENDIX C

CD OF PROJECT



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